1859 PUBLISHED WEEKLY 1920

AMERICAN GAS ENGINEERING JOURNAL

FORMERLY

AMERICAN GAS LIGHT JOURNAL

VOL. CXIII., No. 12
WHOLE No. 3263

NEW YORK, SATURDAY, SEPTEMBER 18, 1920

Subscription $3 per year
$4 Canada $5 Foreign

Library of Congress
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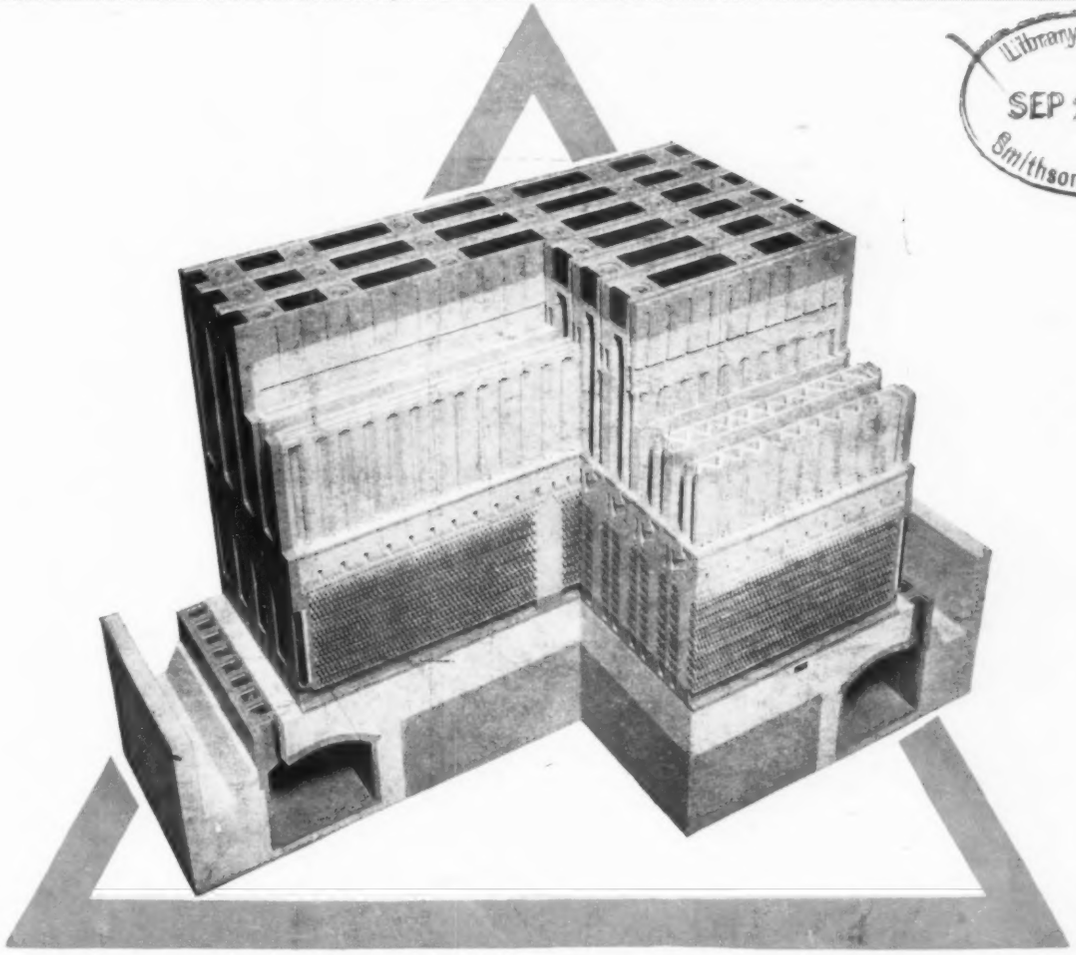

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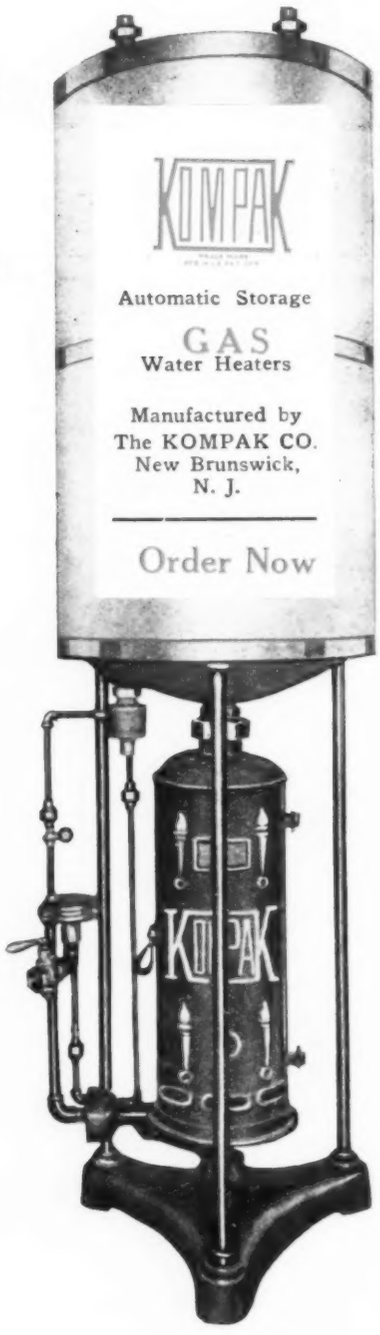
NOT "mere" automatic instantaneous hot water service



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Entered as second-class matter January 9, 1917, at the post-office at New York, N. Y., under the Act of March 3, 1879.

American
Gas Engineering Journal

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Steam Generator and Air Heater Gas Man's Entering Wedges in Seeking Industrial Business in Celluloid Industries

Whether It Be Combs or Billiard Balls Gas Is Found to Be a Desirable and Practical Fuel—Staining and Coloring Celluloid Articles

By GILBERT C. SHADWELL

There is a flammable and an inflammable celluloid, but the term as usually understood mostly refers to the former kind.

In response to the question as to the manufacture of combs by the aid of steam in which a gas-fired boiler is a valuable accessory, the writer was given the following data which is of interest:

The process of manufacture is as follows: The stock is furnished us by the celluloid manufacturers in sheets 21x48 inches, any thickness we desire. We then cut into blanks the size of two combs. These blanks are then placed on the steam heater and warmed until they are flexible; then they are placed in the machine and the teeth cut. They are then allowed to cool when they are ripped apart and we have two combs. The teeth are then rounded and pointed on a burr, the tops and ends scraped smooth then placed on the heater and when flexible are placed on a block the shape of the bend we want and tied down with cloth until cool. They are then rubbed with fine wet ashes on a wheel until smooth, then they are polished on a dry wheel and then they are ready for the market.

This data was printed by courtesy of Allen, McNerney & Co., of Attleboro, Mass.

As to the properties of celluloid a few words will not be out of place at this time, as little seems to have appeared in the gas trade journals on this subject.

Crude celluloid is nearly colorless, and in thin layers is practically as clear as glass or, at most, faintly yellow. It is very elastic, hard; may be either transparent or translucent, nearly unbreakable and can be cut with a knife or shears.

By crude celluloid, the writer means that which is free from all additions of coloring matter, body colors or other substances, designed for the production of special effects. It can be made harder or softer by suitable additions but does not behave like rubber in so far as it cannot become soft and plastic in that way very readily.

Moreover, contrary to what was originally believed, celluloid is apparently not electrified by friction.

Celluloid has a faint smell of camphor and the smell becomes stronger when it is rubbed. It therefore forms a means of identifying one kind of celluloid.

When heated to 125 deg. Cent. (or 257 deg Fahr.) it becomes plastic and in this state can be molded into any desired shape as already referred to. Separate pieces will coalesce on mere contact when warmed. At about 140 deg. Cent. (or 284 deg. Fahr.) celluloid suddenly loses its color and transparency, and at about 5 deg. Cent. higher—say 145 deg. Cent. (or 293 deg. Fahr.)—the celluloid decomposes with the liberation of pungent, inflammable vapors.

Warm, plastic celluloid forms an excellent cement for metals, a property of considerable utility in the production of inlaid work. Celluloid softens in warm water and becomes flexible and somewhat plastic, so that it can be easily molded to almost any shape. This behavior is also very valuable in the manufacture of celluloid articles, since the molding process is greatly facilitated. Moreover, loss of material is prevented and time is saved.

For this reason, very often an expensive steam boiler is rendered unnecessary, as a regular steam generator can be used in its place. More will be said in this connection a little later.

When ignited, celluloid burns with a smoky flame and more rapidly than sealing wax and a smell of camphor is given off at the same time. If the flame is blown out shortly after the ignition, the rest of the material continues to flow and to give off thick vapors of camphor which soon fill the room with a black smoke. Without doubt, the guncotton burns in this case at the expense of its own oxygen, but the temperature is not sufficiently high to ignite the camphor distilled off. This behavior indicates pretty clearly that celluloid is not a chemical combination of camphor and guncotton or collodion wool, since it is characteristic of chemical

compounds that the substances entering into combination cease to exist independently in the compound.

Celluloid can be ignited only by an actual flame in an exposed state. That is to say, that if it is heated in a closed vessel of any kind it simply decomposes, as already mentioned at about 150 deg. Cent. suddenly and completely with the giving off of a good deal of smoke. In no case, however, is there any sort of an explosion, because it cannot be exploded either by pressure, percussion, shock, friction, heat or by any other means.

Celluloid is no longer guncotton, but a substance deriving from it in all its properties. The property of celluloid in softening in hot water enables it to be cut into sheets of any desired thickness and attach itself like pitch, sealing wax or putty, to wood, marble or anything else of a like nature.

If two surfaces of celluloid be coated with collodion and pressed together, the two pieces will unite firmly to form one solid piece.

Celluloid is insoluble in water, and on this account is suitable for making domestic articles such as knife handles, etc. Though it is not attacked by concentrated sulphuric acid, it gradually dissolves in it, cold, a small piece entirely disappearing in about 36 hours. In a similar way it gradually dissolves in strong nitric acid and also in boiling caustic soda or caustic potash.

The tensile strength of celluloid is very high, according to a recognized authority, the results appear to show that the elastic limit is about 200,000 to 240,000 pounds per square inch. That is to say, it is about 1/130 that of iron or 1/7 that of wood. The elasticity is also high. For instance, the tip of a celluloid hairpin can be bent around until the two ends meet and back again until the ends meet in the opposite direction, and this can be done any number of times, the pin retaining its original appearance when straightened out.

To break off the tip it must be bent ack and forth rapidly and with considerable force

These simple tests show the extreme pliability of celluloid.

No Limit to Treatment Methods

This material can also be stained any desired color and the coloring matter is not absorbed merely superficially but permeates the whole mass, as can readily be seen from the fractured surfaces of fractured celluloid articles.

By means of suitable additions and treatment, celluloid can be made to imitate a large variety of materials, for which purposes it is largely used. In all conditions, its surface is extremely smooth and lustrous. It can be sawn, filed and turned in the lathe and in general treated like horn-like materials.

Celluloid can be rolled, polished, pressed, cut and hammered, and can also be kneaded at a temperature of 145 deg. Cent., so that occasionally it may take the place of metals, stone, wood and wax.

The specific gravity varies according to the degree of pressure it has sustained in the manufacture. However, the average is around 1.5.

Having thus briefly given some of its properties, we may consider means for softening it. We have seen that steam is the usual medium and a gas-fired steam boiler is usually employed. This is often very desirable but not always essential.

The generation of steam for its heat is commonly accomplished by means of a steam boiler, the steam being supplied at various pressures and consequently at various temperatures. But steam is also used in hundreds of industries for a medium or low temperature, and in most of these cases where this is the object it is quite unnecessary to employ an expensive pressure steam boiler. In fact, a steam generator which will give off steam at about atmospheric pressure is much to be preferred to a high-pressure boiler in many cases.

Such a steam generator has been designated to meet the demand for an appliance to generate steam at atmospheric pressure.

There are a few other appliances that cover so large a field and have such a diversity of uses. In many places where used for its heat, these generators are preferable to a high-pressure boiler.

Their low cost, high efficiency and safety should cause their adoption wherever practical.

They are very simple in operation and are absolutely safe in every respect. The most inexperienced person can operate them.

No license is required for their operation, as it is impossible to raise the steam pressure above a few ounces, because of a novel arrangement in the boiling chamber, which automatically releases the steam pressure when it becomes excessive. By this same arrangement, warning is given when the water is low, by the steam escaping at the top. They are conveniently filled with water, as it is not necessary to remove any plugs or caps. Where they are to be in continuous use, an automatic water feed is recommended.

They are of substantial construction. The jacket is made of heavy galvanized iron and is well insulated with asbestos. The boiling chamber is made of heavy-gauge copper, which is not corroded by the water or flame. As the copper is also a good conductor of heat, a very high efficiency is obtained. All joints are brazed, thus eliminating the possibility of leakage, caused by allowing the water to run low in the boiler. They are equipped with cored-ring burners which develop steam starting from cold, in a few minutes.

These generators have also found wide favor for the steaming of cloth, velvet, knitted goods, umbrellas, maribou feathers, etc., etc.; for supplying steam for heating and melting honey; for dress plaiting ovens, steam tables, bun warmers, medical cabinets, etc., etc.; there are in fact an extremely wide diversity of uses.

The following details will give some idea of the sizes and other particulars of these appliances:

H. P.*	Dimensions		Gas Consumpt'n (cu ft. per hr.)
	width	Height	
5/8	15 inches	30 inches	50
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An automatic water feed should always be used. It does away with the trouble of filling the boiler. It eliminates danger of boiler becoming dry and burning out.

It will be noted from the above table that although the water vapor or steam is given off at or just above atmospheric pressure the ratings are given in horse power (H.P.). Although this might, at first, appear paradoxical, it is not really so when it is remembered that a boiler horse power is but another way of expressing its capacity. One boiler hp. is the capacity to

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evaporate 34.5 pounds of water per hour from and at 212 deg. Fahr.

The actual work obtained from 1 hp. of steam is about 33,330 B.t.u., but this quantity represents only the latent heat in 34.5 pounds of the steam at atmospheric pressure which it gives up in condensing back to water.

Additional gas consumption and time have to be included in order to raise the water up to 212 deg. Fahr. For this reason an allowance in the gas consumption of a steam generator is usually made so that sufficient leeway may be available between its rated horsepower and the margin of actual gas needed to heat the water up to 212 deg. Fahr. quickly.

A steam generator usually supplies moist steam. However, it is easily possible to arrange the steam pipe so that it will pass over and above the burner and thus supply dry superheated steam.

When a steam generator is connected up the steam-supply pipe should run horizontally or incline upward from the outlet. If this precaution is not taken the condensation will block the passage of a further steam supply.

Billiard Balls

In the manufacture of celluloid billiard balls, the process employed is as follows: To 100 parts of pyroxyline, which must be dissolved, ground and then stained as wanted, are added 300 to 500 parts of solvent. This consists of 100 parts of alcohol, 50 parts of naphtha, 100 to 150 parts of arrow root or starch and 50 to 200 parts of best zinc white.

The solid matters are added to the plastic solution of the pyroxyline and the whole is placed in a closed rolling or grinding apparatus, the rollers being heated by steam for which a regular gas-fired steam boiler is a useful adjunct, and the compound is ground up till most of the solvent is driven off. The latter is recovered by conveying through pipes to a condenser. The resultant mass is now as stiff as clay and can be molded or rolled and placed in a dry room for seasoning. In the latter a gas-fired air heater can be used to good advantage if properly installed. When well seasoned, the ball may be formed. When less specific quantity is required, it is best to employ as much amylaceous substances as possible, as they are lighter than the zinc. Ground and bleached cotton fiber may be rubbed up with the plastic pyroxyline, in the proportion of 100 parts of disintegrated cotton to 300 parts of pyroxyline paste.

When making colored celluloid with amylaceous substances or cotton, the colors should be added at the same time, and ground up with the other ingredients.

Plastic cellulose can also be prepared from nitrocellulose by substituting naphthaline for camphor. This effects a great reduction in cost and in this way it can be made without camphor by a patent process.

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The Staining and Coloring of Celluloid Articles

Though celluloid is obtainable in a variety of colors, it is sometimes necessary to stain finished articles another color. Very often, coal-tar dyes dissolved in spirit make excellent stains for this composition, and for special purposes, the following methods are recommended:

Black.—The article is, first of all, dipped in weak alkali, then in dilute silver nitrate and finally left to dry in sunlight. This causes the well-known photographic process to occur which gives the desired result.

Blue.—A solution of indigo nearly neutralized with potash is used or a solution of Prussian blue. Again, a bath of ferric chloride can be employed. This can be followed, after drying, by one of potassium ferrocyanide.

Brown.—In this case, a solution of potassium permanganate, made alkaline with soda, is used.

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The mordant and color can be applied to the printed plate by dipping the latter in a dye bath, whereby the coloring matter penetrates the hollows of the pattern and forms a thicker layer there than on the rest of the surface.

The sheet is then subjected to powerful pressure, assisted by heat, between plates which may be polished or not. The pressure and heat smooth the surface again and bring into suitable prominence the deeper portions which before were hardly noticeable. If one side of the sheets is to be polished, a polished plate is pressed against the portion that was not brought into contact with the dye and this brings the drawing prominently up on the polished surface, though it was actually impressed on the other.

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taining best white shellac and sandarac, or some other resin.

This bath is acidified with boric acid and shortly before use a little ether or benzole is added so as to quicken the drying of the colored layer on the surface of the celluloid.

The celluloid sheets are only immersed for a very short time, this being sufficient to take up the mordant and to color the surface. The colored layer dries very quickly.

If only one side of the sheet has to be stained, the other is first coated with asphaltum.

These colored sheets are suitable for various purposes, such as identification devices, signals, etc. They are, of course, unbreakable and are fast colored.

Hardening and Softening Celluloid

There is no actual method of hardening celluloid after it has been made. If it is required hard, then 3 to 5 per cent of resin or shellac is mixed with the original pyroxyline for the manufacture of the celluloid. To soften the celluloid and make it readily flexible, castor oil is used.

Opaque celluloid can also be made much harder and more like ivory by the addition of such materials as zinc oxide and calcium carbonate.

Non-Flammable Celluloid

There are several systems of making incombustible celluloid, but the two following are typical of the others.

In the first case, they prepare a solution of celluloid and add to it a mixture of ether and alcohol containing iron salts. A clear liquid of the consistency of syrup is the result and if the solvents are driven off from this, an incombustible, non-inflammable celluloid remains. It appears that iron chloride is used, and this is said to tend to extinguish any flame which might be formed.

Non-combustible celluloid is also prepared from ordinary celluloid by dissolving the latter in four times its weight of acetone and magnesium chloride in three times its weight of alcohol.

The solutions are needed in the proportions of five to the one to one of the latter. A paste is formed which is thoroughly mixed and dried.

Celluloid is polished by making a sort of putty of hot soap (free from resin) in which equal parts of fine pumice and emery flour have been mixed.

As to printing on celluloid, ordinary lettering can be done in the usual manner. However, the material has to be specially prepared first of all so as to get a matt or rough surface of suitable grain. This is done by sand blast or other convenient means.

There are other particular methods but although interesting to the specialist they would hardly be of value to the industrial gas man.

Celluloid Substitutes, Etc.

A transparent substance often spoken of as celluloid is useful for the production of plates, tubes and other articles, but especially for photographic films. It is made by dissolving 1 to 8 parts of nitro cellulose (by weight) in 16 parts of glacial acetic acid by means of heating and stirring. Then 5 parts of gelatine are added.

After this has swelled up, 7.5 parts (by weight) of 96 per cent alcohol are added. The stirring has to be kept up all the time.

The syrupy product is capable of being pressed into molds or poured, after further dilution with the solvents mentioned in the proportions given above, upon dried glass plates so as to form thin layers.

The dried articles are well washed with water (which sometimes contains a little caustic soda, *i.e.* soda lye) and then dried again.

Photographic foundations produced in this or similar ways do not change, do not attack the portion of the film which are sensitive to light and do not electrify. Also, in developing they stay flat.

White Celluloid

White celluloid is produced very easily without unduly increasing its specific gravity, as follows:

The dissolved pyroxyline, etc., are mixed with white starch either from wheat, rice or potatoes, or with rosewood, tapioca or other amylaceous substance, or with wheat flour with cotton ground and bleached.

As to working celluloid, this is carried out in the same way as bone or ivory. In the case of trimming it, the tool should be kept cold with water. In the event that the work should tear, the celluloid is heated in water at about 100 deg. Fahr., or else steam may be used from a gas-fired steam generator, as already spoken of.

Imitation Tortoise Shell

Celluloid constitutes one of the most suitable imitations of tortoise shell that has yet been invented.

Celluloid sheets employed for this purpose range from 1/25 to 1/8 of an inch in thickness as a rule. The ground color of real tortoise shell is a faint brownish yellow, to imitate which the celluloid is stained with picric acid in the process of manufacture, by means of a solution containing a little aniline brown (picric acid by itself being too yellow).

The reddish brown spots so characteristic of tortoise shell are imitated by means of an alcoholic solution of aniline brown with a little fuchsine to bring out the reddish tone. As celluloid is softened by strong alcohol, these solutions penetrate deeply into the mass.

The sheets having been highly polished before applying the color, the luster removed by this latter operation is restored by rubbing with woolen cloths or burnishers.

Articles of definite shape, such as combs, etc., are sometimes not painted until the shaping process is completed.

Imitations of smooth and rolled metal wire, stars of thin leaf gold or silver for inexpensive cigar cases and purses, small fancy boxes, etc., are pressed into the mass as already described, the latter being then smoothed, polished and finally colored.

When the coloring is applied by a skilled operator, it is hardly possible to distinguish the imitation from the genuine tortoise shell by the appearance.

Forty-four Million Ft. Gasser in Oklahoma

Word has just been received of the bringing in of a 44,000,000-ft. gasser near Duncan, Okla. This well is about a mile and a half south of the big Best of All gas well, owned by the Empire Company, which was brought in about six weeks ago, and is about four and a half miles west of the Empire field.

Shortage of Coal Looms a Highly Important Factor in Gas Works Economy

B. B. Saul Shows Even Small Loss by Deterioration Is Well Worth Considering Under Present-Day Conditions

In these turbulent days of strikes and unsettled conditions, of ever rising costs of production and uncertainties of transportation, the problem of coal storage looms in the limelight. The ascendency of this question to this important place, marks a new era, not only in the gas industry but in all industrial ventures. For today coal is king. A slight reduction in the quantity of gas produced by a coal due to spontaneous heating was formerly regarded as negligible, and quite unavoidable; but with the present high cost of coal and what is of even greater importance, its apparent scarcity, compels the gas engineer to modify his views, declared B. B. Saul in his Canadian Gas Association convention papers.

Storing a Third of Annual Consumption

However, in this problem on the storage of coal, we are not alone. Our large battleships consume as much as 500 tons of coal a day, thus necessitating coaling stations where enormous quantities of coal are stored. Railroads are likewise obliged to carry large quantities of coal, while various industrial establishments are confronted with the same problem, although, ordinarily on a much smaller scale.

Formerly gas plants depending on railroad transportation found it necessary to store one-third of their annual coal consumption; those depending on steamers generally carried two-thirds; while plants located near collieries carried a stock for six to eight weeks' consumption. Under present conditions, however, the above figures should be multiplied by a factor of safety.

Whenever large quantities of bituminous coal are stored, three important factors come into play, namely: (1) Liability to spontaneous combustion; (2) labor required for storage; (3) Cost of storage. It is now generally recognized by gas engineers that the first one enumerated, namely, the liability to spontaneous combustion is of great importance in so far as it is an item which determines the ultimate cost of the gas produced. In view of this fact, it would be altogether fitting to review in a cursory way the theoretical considerations underlying this hidden peril.

Microscopical and chemical analyses show that coal consists chiefly of humus bodies, i.e. highly unsaturated organic compounds, resinous bodies, carbon, hydro carbons, a certain amount of free and combined water and mineral matter generally designated as ash. Humin, the residue obtained by first extracting the coal with benzene to remove the humic acid, is an extremely chemically active substance. Humic acid absorbs large quantities of free bromine and also ozone, the latter forming ozonides which readily decompose in the presence of moisture, liberating considerable heat. It is this exothermal decomposition which is considered to play an important part in contributing to spontaneous ignition.

For a long time the origin of spontaneous combustion remained a mystery. It was not until Jons Jacob Berzelius, the brilliant Swedish chemist, suggested that a possible explanation for spontaneous heating might be due to the oxidation of pyrites in coal. And until this day Berzelius' suggestion is the popular explanation for spontaneous heating. Later experiments failed to confirm this view. Richter denied this in its entirety, while Professor Lewis stated that the oxidation of pyrites plays only a subsidiary part; also Fayol's experiments show that spontaneous heating is due primarily to the direct oxidation of coal, and not to pyrites, while Dennstedt, Bunz and others have pointed out that coals containing pyrites in insignificant quantities are very apt to fire spontaneously. Others believe that the role played by pyrites is mechanical, for during oxidation into the sulphate and the oxysulphate it increases in volume, breaking the lumps of coal, thereby exposing fresh surfaces to the atmosphere. A further absorption of oxygen causes a further increase in the temperature of the coal pile, and this vicious cycle continues until ignition occurs. Whatever the true explanation may be, there is no doubt that pyrite does oxidize especially in the presence of moisture, and certain catalytic agents, and the heat thus liberated contributes its mite towards the final ignition temperature.

Extensive experiments carried out by Parr and Kressmann at the Engineering Experiment Station, University of Illinois, on the subject of spontaneous combustion of coal, concluded that the average temperature at which autoxidation begins varies between 200 to 275 deg. Cent., according to the size of the coal particles, while ignition generally occurs beyond 350 deg. Cent. The temperature of autogenous oxidation depends on the following factors:

(a) External Sources of Heat.—These may be contact with steam pipes, hot walls, heat of impact due to method of unloading, climatic conditions at the period of storage, and direct absorption of heat from the sun or reflected surfaces.

(b) Degree of Fineness of the Coal.—The oxidation of carbonaceous matter is of course a function of surface exposure of the coal to the atmosphere.

(c) Easily Oxidizable Compounds.—Bituminous coal contains unsaturated compounds which on account of their chemical structure have a marked avidity for oxygen. This property depends largely upon the freshness and the state of division of the coal and cannot, therefore, be regarded as an absolute index of a given sample of coal to spontaneous heating.

(d) Iron Pyrites.—The oxidation of pyrites is a positive source of heat and this may be regarded as the second stage in the process of oxidation. In case of the Illinois type of coal the iron pyrites usually exceeds 6 per cent, or, as sulphur above 3 per cent. The authors have calculated that the heat increment due to oxidation of only 1/5 of this material is sufficient to raise the temperature of a coal pile about 70 deg. Cent., assuming no loss by radiation. Under ordinary conditions of storage there would be little loss of heat by radiation.

(e) Moisture.—The oxidation of pyrites is greatly accelerated by the presence of moisture.

(f) Oxidation of Carbon and Hydrogen.—This is the third stage of the process and occurs above 120 deg. to 140 deg. Cent. This is an exceedingly dangerous stage, owing to the large amounts of heat liberated in the oxidation of carbon and hydrogen. Hence to prevent the coal from attaining this third stage of oxidation it is necessary to eliminate the initial or contributory process.

(g) The Fourth or Autogenous Stage of Oxidation occurs when the temperature of the coal exceeds 200 to 275 deg. Cent. Above 300 deg. the decomposition of the coal begins, which, on account of its exothermic character, causes an increment in the temperature of the coal; this continues until the ignition temperature is reached, usually above 300 to 400 deg. Cent.

Not Always Safe to Drench Pile

Any measure to be taken to prevent spontaneous combustion must be in accordance with the principles indicated above. External sources of heat should be eliminated while the finely divided coal should be separated. Dryness in storage would prevent the oxidation of pyrites in the coal, but in open storage this cannot always be accomplished. When a pile of coal has heated it is not always safe to drench it, especially so when the coal is high in sulphur. The only ultimate safe course is to remove the heated portions.

A somewhat interesting cause or rather contributory cause for spontaneous combustion was given by E. Galle, a German scientist. He made a bacteriological study of different coals under both aerobic and anaerobic conditions, and of seven kinds of bacteria isolated, four when grown in suitable media in the presence of coal produced a combustible mixture containing from 72 to 85 per cent methane. This combustible gas mixture is produced by the bacteria under conditions approximating those which prevail in nature, so that its formation in large coal deposits is probable. The author concludes that while bacteria cannot be regarded as the sole cause for the spontaneous ignition of coal, it is possible that by their vital activity they play a more or less important role in the process.

The methods for storing coal may for this purpose be divided into three classes: (1) An ordinary pile or dump generally open, but sometimes containing a roof or shed. (2) Pockets or bins. (3) Submerged storage.

The first method, that is open storage, is at the first consideration the simplest, yet unless carried out properly it is the most difficult and the most expensive in the long run. The frequent method of dumping the coal in a haphazard way gives the maximum trouble. As a typical illustration of this method let us turn to the C. P. R. whose experience in this line is considerable, because of the huge quantity of coal stored throughout the country.

Their method is a pure open type with ventilating holes spaced at frequent intervals. Their success apparently depends on the care of making these ventilating holes and by limiting the height of the coal dump. The procedure employed consists in forcing an iron rod about an inch in diameter through the coal pile and working the rod back and forth until the hole is definitely formed through the entire depth of fuel. The rod is then withdrawn, its end fixed in a tapered molding about 3 in. in diameter, and the latter forced down through the original hole. The casting is removed and a piece of tar paper about 8 in. long, cylinderically shaped, is placed in the upper part of the ventilating hole so that about 2 in. of the tar paper projects above the surface of the coal. The object of this tar paper is to prevent coal particles from finding their way in the ventilating hole and thereby gradually sealing it. These holes are placed every 3 ft. for slack, about every 4 ft. for run of mine, and for high sulphur coal the distances are shortened. About every 25 ft. a rod is allowed to remain which acts as an indicator as to the progress of spontaneous heating. Every week a man makes his rounds, removes the indicator rods and by feeling them reports them as cold, warm, very warm or hot. If warm, water is run into the ventilating holes in the immediate vicinity where heating has occurred and this process of cooling is continued until the temperature is brought back to normal. It is obvious that the man soon becomes so accustomed with this inspection work, that by withdrawing the rod but a few feet will tell him the progress of heating. The height of the coal dump is limited to 10 ft. for slack and 15 to 18 ft. for run of mine and lump coal. The labor involved in making the ventilating holes while considerable is worth while, two men making 150 holes a day, based on a ten-hour day. The cost of storage is estimated by Mr. Britt, their general fuel agent, is between 4 and 5 cents per ton. Mr. Britt further stated that this expensive process of making ventilating holes is not necessary with all coals. For example, Ohio and Pennsylvania coals if stored separately are perfectly free from any danger of spontaneous heating, but if mixed and stored together, the danger becomes very great. For this reason coals from different beds are stored separately wherever possible in order to minimize this lurking danger. On the other hand coal from Nova Scotia or Illinois being high in sulphur, greater precautions are taken with them during the storage, that is, either the height of the dump is decreased or the number of ventilating holes are increased. By following the above precautions religiously the two and a half million tons of coal stored all over the country gives the C. P. R. every little trouble.

The idea of ventilating a coal pile is often condemned as unsatisfactory. It must be pointed out here that ventilation should begin as soon as possible after storing the coal, and not when heating has already commenced. For in that case ventilation would tend to accelerate oxidation and the heat thus generated would be greater than the heat dissipated.

Storage Costs 2¾ Cents Per Ton

When coal is stored under a shed to a height of 30 ft., which is our procedure, the question of ventilation becomes more complicated. First of all it is impracticable to force a hole through a coal pile 30 ft. deep, and again the roof of the shed would interfere with this operation. However, iron pipes with holes on the side could be installed in the coal pile for the purpose of ventilation, but this is unsatisfactory since these holes easily plug up and sometimes only the hole through the pipe exists. In that case ventilation is a positive source of danger, since the draft thus created speeds up the spontaneous heating. Hence the iron ventilating pipes have been abandoned by us. Our coal piles are under eternal vigilance and when localized spots reach the danger point they are immediately removed. Our cost of storage is within the neighborhood of 2¾ cents per ton.

Various other precautions against spontaneous heating have been suggested, such as the circulation of a cold liquid or gas through the coal pile. While this precaution might prove successful, the expense involved makes it impracticable. Another method suggested is the coating of the outer surface of the coal pile with heavy oil, obtained in petroleum distillation, the object here being to exclude air in coming in direct contact with the coal, thus preventing oxidation. To listen to some of these suggestions or to read reports on the prevention of spontaneous combustion often carried out by investigators who ignore the practical and monetary

question, reminds one of Shakespeare's words: "I would rather teach twenty what were good to be done, than to be one of the twenty to follow my own teachings."

The second method is the storage of coal in pockets or bins. This is more rational than open storage as far as prevention of spontaneous combustion is concerned, but the expense incidental to this method has prevented its application on a large scale.

A rather elaborate method to guard against spontaneous combustion is taken by the United States Government with its coal storage plant at Bradford, in Narragansett Bay, near Newport, where it has a storage capacity of about 60,000 tons. The coal bins or pockets contain 4-in. temperature tubes of galvanized iron and about 20 ft. long, set in the bin floors and projecting upwards through the coal pile. They contain thermostats which record temperatures above 150 deg. Fahr. The 232 tubes are connected to a general annunciator which is installed in the superintendent's office, so that in case the temperature of a bin has reached the danger point, an alarm is sounded, giving the exact location on the indicator.

This method of coal storage is also employed at the New York Navy Yard, where compartments of 525 gross tons capacity have been built. The floors of these bins are made of Portland cement, the walls of a mixture of cement, sand, and anthracite boiler cinders, and the roofs are made of iron.

The third method or submerged storage is the most expensive, although probably the most economical in the long run. The largest plant of this type is at Brunot's Island, Pittsburgh. The pits, built of Feror concrete, are 800 ft. long, 150 ft. wide, and 25½ ft. deep, with the sides sloping at an angle of 45 deg. Full storage capacity of this plant is 100,000 tons. A small plant is also found at Chicago.

Coal Submerged Fourteen Years Deteriorates Only 1.9 Per Cent in Heating Value

All experiments agree on the effectiveness of submerged storage to obviate spontaneous heating and to effectively prevent weathering. The coal recovered from the battleship Maine which had been submerged for 14 years showed a decrease in its heating value of only 1.9 per cent.

Sometimes a combination of open and submerged storage is resorted to. Only a part of the coal is submerged while the upper portion is exposed. This method was attempted by the Canada Cement Company but the pit was not made of concrete, so that the water permeated through the sides and disappeared. Sufficient data were not available to permit definite conclusions.

Returning again to open storage, let us consider the question of deterioration of coal during such storage. Contrary to popular belief, most experimenters agree that the loss is insignificant. In the *Journal of the American Chemical Society*, 1908, Parr and Wheeler describe a deterioration of coal which cannot be ascribed to weathering, but rather due to a change of physical conditions which the coal was subjected to in the seam. This loss sometimes amounts to as much as 1.3 to 3.4 per cent, and the authors attribute this loss to a liberation of gases owing to a change of the conditions of pressure and sealing in the seam. However, this loss probably takes place before the coal reaches its destination.

As for the escape of volatile combustible matter during open storage, tests conducted by Porter and Ovitz of the U. S. Bureau of Mines show that to be inconsiderable in point of weight and calorific value. Of a large number of coals investigated the one showing the greatest loss in V.C.M. during more than one year exposure to air, was only 0.16 per cent of its calorific value and less than 0.1 per cent by weight.

With the object of determining the effect of open storage on gas coals, tests were made at the Karlsruhe experimental gas works with the same coal, part of which had been stored in the open air to a height of 3.5 meters for 3½ years, and part in bunkers to a height of 3 meters. As far as gasification is concerned there was no noticeable difference, but the coke obtained from the coal stored in the open was much smaller and more friable.

In 1916 a series of tests were carried out at the Experimental Station maintained by the Michigan Gas Association and the Chemical Engineering Department of the University of Michigan, using Pittsburgh-Fairmont gas coal. The following tabulated results were obtained:

Duration of Weathering	Ft. of Gas Per Ton of Coal	Candle Power	B.T.U. Per Cu. Ft.
6 mos.	10,135	15.4	631
1 year	9,353	17.4	645
2 years	10,346	16.9	621
3 years	10,373	16.3	615
4 years	10,590	15.0	613
5 years	11,102	15.5	620

These tests show that apparently weathering has no effect on the quantity and quality of the gas produced.

For further experimental evidence as to the slight loss during weathering, let us turn to the recent work of Porter and Ovitz. Tests were made on New River and Pocahontas coals (both semi-bituminous) on Pittsburgh (bituminous) and on Wyoming (sub-bituminous). These coals were exposed to atmospheric influence by storage in piles and in bins. A wide range of climatic conditions was secured by carrying out the experiments at several stations, including the Isthmus of Panama. Except in the case of the sub-bituminous coal, the maximum loss of calorific value during exposed storage was 1.2 per cent in the first year, and 2.6 per cent after two years. The sub-bituminous coal, which was stored in bins, lost 2 to 3 per cent in the first year and 5.5 per cent after three years.

These losses may be decreased if not altogether prevented, by submerging the coal. But under existing conditions this method is hardly justifiable in point of expense. The additional water taken up by the coal must be evaporated so that the slight saving in weathering is more than compensated by this loss. To be sure the coal could be removed several weeks before use to allow the water to drain, but this would mean a double handling of the coal.

Gas engineers may feel at ease with their present mode of open storage provided effective precautions are taken against deterioration due to spontaneous heating. Repeated experiments prove that exposure to air does not materially affect a coal. Richter and Dennstedt in Germany, Fayol and Boudouard in France, Porter in the United States, and Winmill in England, have studied the nature of the reaction of coal with oxygen at ordinary temperatures. They have shown that while a relatively small amount of oxides of carbon and water are formed, the principal reaction is an additional product which merely produces a slight increase in the weight

of the coal. Repeated experimental evidence shows that no appreciable amount of combustible substance from the coal takes place either by oxidation or volatilization.

Before closing it would be well to repeat that whenever coal is coming from mixed sources, analysis of each shipment should be made and high sulphur coal put into an isolated pile if possible.

Under the desperate coal situation existing this summer, all kinds of coal are being shipped, even with sulphur as high as 5 per cent, and it becomes more important than ever to know what the sulphur content of the coal is before it is put into storage, both from point of view of coal pile fires and also to avoid using a coal with an average sulphur content that would tax your purifying plant beyond its capacity to clean the gas.

Laying Submerged Pipe in Canadian Practice

D. L. Hill Describes Construction of and Joint Failure in Toronto Bay Line

The 12-in. main crossing under the old Western Channel to supply Hiawatha Island in Toronto Bay gained for the gas industry valuable data in the relative value of cast-iron and wrought-iron pipe as a means of under-water gas transmission, also the more efficient type of joint or coupling, declared D. L. Hill in a Canadian Gas Association paper. This was the first gas main laid under water in Toronto. It consisted of 450 ft. of 12-in. wrought-iron pipe, screw joints, reinforced with 12-in. cast-iron split sleeves made to fit tight.

It was laid in a channel 6 ft. deep, blasted and dredged out of solid rock.

The pipe was jointed on the wharf and the two 28-in. standpipes connected, split sleeves placed over the joints and tested to a hydrostatic pressure of 100 lb. It was then capped and launched into the lake, towed into position and lashed to three scows, one at each end and one in the center. The pipe when launched was so buoyant that it was necessary to partially fill it with water before it would sink. After the proper grade was given to the pipe, the space between the pipe and the bottom of the channel was filled with sharp sand through a pipe. This sand bed was carried up to a little better than halfway up the pipe and leveled over the whole length of the channel. The pipe was then covered with about 2 to 3 ft. of concrete. The leveling and blocking up was done by an experienced diver, and after the concrete had time to set the water was pumped out of the pipe and upon testing was found to be tight, and has remained tight ever since. This work was completed in January of 1902.

When plans for the harbor improvement were completed it called for the above channel to be filled in and a new one constructed further from the mainland and with a greater depth in order to accommodate vessels of greater draft. When this new channel was built it was not dredged out full depth, so that we were compelled to lay this main below the proposed deep-water line. This necessitated the dredging of a trench 14 ft. deep in the rock bottom of the channel. This was a very tedious job, as the work was done before the cribbing for the channel walls was put in place. The contractors engaged on this work were no respecters of persons or water craft, either submarine or afloat, and consequently our anchor cables, etc., were frequently fouled with their equipment, necessitating the moving of our dredge. These obstacles, coupled with bad weather conditions, rendered this work a long drawn-out job. However, ultimately the trench was completed the full width of the channel. Concrete blocks, having been made in advance, were then put in place to receive the pipe. The pipe was 12-in. cast iron, 12-ft. lengths, flange joint, twelve bolts, and weighed 100 lb. to the foot. Wood gaskets were used for jointing, and when laid the pipe was 31 ft. below mean low-water level. The pipe was graded to fall toward the south and a pump placed permanently at the standpipe, as it was impossible for the drip wagon to reach this point. The pipe was tested for tightness every 150 ft. when laid, and all blocking and jointing under was was done by two divers. This pipe was laid in 1910 and gave no trouble until the winter of 1919, when a break occurred which, upon investigation, was found to be at a flange.

We could ascribe no reason for the cause of the break other than a possible settlement of the standpipe in the north end, as the break occurred immediately back of the flange on the first length through the jetty wall, but there was no conclusive evidence that this was the cause, as there were three successive joints broken in exactly the same manner. The elements seemed to have conspired against us when these repairs were made. One day, or perhaps two, was the average time per week we could work on account of the weather, as we could only use the sand pump when the water was calm. Oftentimes we would have the sand all clear round the pipe at night and before morning the water would be too rough to work, which might last for two or three days, and by the time it was again calm about 10 ft. of sand would have been washed in on the trench over the pipe again.

When we finally did get each joint clear, we had a special split sleeve made to cover the flange, with five bolts on each side. Lead wool was used in making the joint, with mill board between the flanges.

From our limited experience, wrought iron or steel is the only satisfactory pipe to use for under-water work. It is much easier to lay, in the first place, almost as durable, and much easier to repair in the event of a leak, and the danger of leaks or breaking is immeasurably minimized and flanged joints particularly should be avoided.

St. Johns, N. B., Line

A very interesting installation of an under-water pipe was laid for water at St. Johns, N. B., to supply Partridge Island, situated about 3,500 ft. from the nearest point on the mainland at the entrance of St. John Harbor. While there is not much in common in the operation of water and low pressure gas pipe, there is with high-pressure gas; but aside from these considerations there is much which might prove useful information to anyone whose operations brought them in contact with sea water. In this instance the channel separating the island from the mainland has a depth of 15 ft. of water at low tide and a maximum tidal range of 28 ft., giving a depth of 43 ft. of water at spring tide. Owing to

(*Continued on page* 222.)

American Gas Engineering Journal

SIXTY-FIRST YEAR

Published Weekly by AMERICAN GAS LIGHT JOURNAL, INC., 150 Nassau Street, New York, N. Y.

ELBERT P. CALLENDER, Pres. S. G. KRAKE, Vice-Pres. FREDERICK A. SOUTHWORTH, Sec'y-Treas.

EUGENE C. MILES, Editor

Subscription $3.00 per year, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines; in Canada, $4.00; foreign, $5.00—Single Copies, 10 cents

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As the Journal Views It

People Talk of Central Gas Heating Plants

A few years ago one of the amazing discoveries a newcomer seeking light as to gas industry possibilities was that central gas-fired house-heating plants were an actuality; that, though conceded by gas men to be considerably more expensive in primary fuel costs, they were not sufficiently so as to make them by any means impractical.

The layman at large viewed even seventy-five and eighty cent gas as something to be respected. While conceding the convenience of the pilot light on his gas-lighting fixture, a goodly proportion got chills in the spine at the thought of how much money that tiny flame was eating up; they sacrificed the convenience in large numbers, preferring to use matches and save gas even in minute quantities.

Gradually the average consumer has been attaining a larger viewpoint as to gas usage. The gas range was a stepping-stone, the automatic water heater a great leap forward, in effecting this change.

The layman, even with dollar-fifty and two-dollar gas, is not frightened every time he sees a gas flame even as large as the range giant burner.

We doubt if he has fully corrected the delusion as to gas being an expensive fuel to the degree almost of being a luxury fuel, but he has decided even if it is expensive the convenience afforded is well worth all the cost.

A few years ago, as stated, few outside of the gas industry ever heard of central house heating by gas; ever even thought of it.

But to-day people are seriously talking of it; manifesting a receptive attitude toward more complete information in regard to it.

It would be timely at this period for the gas industry to garner data as to results obtained in various types of houses in various typical situations. These should be given wide publicity in which exteriors of houses and the situations should be pictured and described.

People are talking about central house heating by gas. Give them something tangible upon which to base their judgments and the talk might easily be transformed into action.

Lighting for Heat

A ton of coal, more or less, burned in our cellars during the course of a heating season has become a matter worthy of consideration. And so the ancient bugbear of gas lighting—its heat—is being ushered out of the recesses of our minds where we had long sedulously concealed it and used to confound the electric lighting salesman as once he used it to confound us.

Its heat is being advanced as a distinct selling point of gas lighting.

A single gas arc, they tell us, will supply all the heat necessary for a small shop of a kind where its occupants are kept more or less physically active—shoemakers, for example—and just consider how much the heater will be helped out on upper floors by the heated air that will drift up from the gas lamps necessary to heat the ground floor of a dwelling place.

And we are not just making trouble for ourselves next summer. Windows are open at the top then and the gas heat waves aid ventilation instead of adding to summer's heat within the house.

Laying Submerged Pipe in Canadian Practice

(*Continued from page 220.*)

this great tidal range, a flow of two to three knots per hour is sometimes encountered in this channel. Owing to the reversing falls at the outlet of the St. John River in St. John Harbor, the tide sets outward unusually strong and lasting until nearly half flood-tide.

In 1906 a 6-in. extra heavy galvanized wrought-iron pipe, with ball and socket joints, was laid across the above-mentioned channel to supply Partridge Island with a fresh water supply. For a distance of about 2,000 ft. the pipe was protected by a breakwater.

The pipe came in 18-ft. lengths and was connected up on a scow and lowered into position. Owing to the shallowness at low water a trench was dredged out to the end of the breakwater, into which the pipe was laid, but was allowed to rest on the bottom of the open channel, as it was very level at this point.

The pipe was found to be tight when completed, but it was almost immediately damaged by the anchor of a vessel, which probably strained several joints. On another occasion the fresh water froze in the pipe submerged in the salt water. The pipe was far from satisfactory almost from the beginning and inside of five years more money had been spent in searching for and repairing leaks under water than the original cost of the pipe. In 1912 it was finally condemned.

To replace it a 4-in. flexible bronze tubing was chosen, being considered especially adaptable for this work owing to its flexibility, weight and durability in salt water. The tubing as specified was required to contain 98 per cent copper of the usual flexible type, which consists essentially of a strip of bronze, wound spirally, each winding overlapping and interlocking with the last, the joint thus formed being packed with asbestos. Couplings were threaded to the grooves on the outside of the pipe and rendered tight by soldering. The tubing was supplied in 30-ft. and 40-ft. lengths, with couplings attached, and is supplied up to 12-in. diameter by the United Flexible Metallic Tubing Company, of Ponders End, Middlesex, England, but the above pipe was supplied by the Fairbanks-Morse Company, representing the American Metal Hose Company.

Instead of allowing the new pipe to lie on the surface of the bottom crossing the channel, it was buried in a dredged trench 6 ft. deep When laid it was subjected to a hydrostatic pressure of 200 lb. per square inch. This tubing has given entire satisfaction, is absolutely water-tight, as demonstrated by frequent tests, and a pressure of 40 lb. per square inch is maintained.

From this experience there appears to be no good reason why this tubing would not prove an ideal means of gas transmission under water within certain limits, both for high and low pressures.

The laying of a 36-in. water main across the Narrows, New York Harbor, was responsible for the development of perhaps one of the most unique cast-iron joint pipes known. The difficulties encountered were magnified many times over those usually met with, due to the fact that the Narrows is the opening or main entrance to New York Harbor from the ocean. Through it pass the largest vessels afloat, together with all kinds of other water craft, making it one of the busiest channels in the world. It is also the anchorage grounds for merchant vessels and ships of war.

Government regulations require that no refill shall be placed above elevation 45 mean low water, and protection to the pipe required 8 ft. of refill, so that the under side of the pipe must be at least 56 ft. below mean low water. This great depth made it advisable to do as much of this work as possible on the surface, therefore continuous laying by means of a cradle was adopted in preference to lowering in sections and jointing them together at the bottom. The length was nearly 10,000 ft., and after prolonged study was given to the design and metal to be used, dense, strong cast iron, low in graphite carbon as could be obtained, was considered the best material. Pipe to be made in 12-ft. lengths, with Ward Duane joints, subject to slight modification which was developed by experiment and test.

The chief points of interest to gas men in connection with the laying of this main is the joint and the methods employed in lowering the pipe into

place. The Ward Duane joint is in reality a ball-and-socket joint with lead as jointing material, caulked in the usual way. The joint when finished will permit of a maximum deflection of 10° 50′ +. Much attention was given to the question of a jointing material, but lead was found to be the most satisfactory.

The shrinkage of soft pig lead when cast in such a space and the shallow effect of even good caulking was well known and observed experimentally. Even with pneumatic hammers the lead was found to be consolidated not more than ⅜ inch to ¾ inch from the face of the joint. When a caulked lead joint is moved, as in the deflection of a flexible joint, the effect of the caulking is almost nullified. Lead wool was tried because it could be caulked strand by strand from the bottom of the face and, being put in cold, would not shrink like cast lead. This joint held tight under hydrostatic pressure so high that the cast lead was driven nearly out of the joints in the same line of pipe. But the lead wool joints were so rigid that the force required for deflection defeated the purpose of a flexible joint.

It was proven that under a steady pressure of 700 lb. per square inch lead would readily flow. Advantage was taken of this property of lead by drilling and tapping holes immediately back of the hub. Set screws were then screwed into position so that the ends when home were flush with the inside of the bell. Molten lead was then run into the lead space, and after it cooled off the screws were removed and a thick mixture of graphite and mineral grease was forced into the shrinkage space between the lead and bell. Cast lead plugs about 9/16 in. diameter and 1¾ in. long were then inserted one at a time into each of the thirty-two holes. The holes were staggered so that sixteen were nearer the spigot end of the pipe. There were three plugs insrted in holes nearest the bell and four into the latter, making about 22 lb. lead per joint. These plugs were easily pumped in by the screws with a 12-in. wrench and the quantity could be determined by the graphite and grease oozing out at the face of the bell.

The joint were made on the deck of the scow as follows: The inside of the bell is first painted with graphite. The spigot end is then inserted and centered, after which the lead is poured, requiring about 300 lb. per joint. The lead plugs are then driven with compressed air, after the caulking is done. The joint is then deflected 5 deg. and tested under 100 lb. pressure before launching. In laying the pipe, a scow 125x40 ft. was used with a 70-ton derrick for handling pipe and auxiliary operating. A cradle or skidway for laying the pipe is suspended from the bow and stern of the scow. It was of structural steel in the form of a through truss curved in the vertical plane. It is 168 ft. long, 8 ft. wide and 10 ft. high, and weighs nearly 60 tons. The pipe is held in place by three guides. As soon as a joint is completed the skidway is drawn ahead and the finished pipe slips off into the dredged trench.

In a paper of this kind a whole volume could be devoted to the various methods employed in trenching and laying, as well as pipe designs, etc., for each engineer seems to have his own individual views regarding the work. Some methods would seem to be of the most primitive character, yet they proved effective, inasmuch as they accomplished what it was intended to do. For instance, in laying the intake pipe for East Toronto it required 1,800 ft. of pipe and, as it was impossible to get a dredge to work so far away from a harbor, a very novel means was employed to excavate the required trench. The bottom being very sandy and shallow for a considerable distance from shore, a tug was engaged and backed into the line of trenches until the rudder shoe touched the bottom. Lines were then fastened on shore to a winch. When the lines tightened the propeller was started full steam ahead. This churned the sand and gravel, throwing it up on both sides and ahead; at the same time the shore lines were wound round the winch, drawing the tug inshore.

In this way the trench was dug over 10 ft. back from shore line and 8 ft. deep, covering a distance of about 350 ft. of excavation.

A very nice method was employed by Charles H. Gow, of Boston, in laying a small cast-iron main across a shallow stream. The stream was about 75 ft. wide and 5 ft. deep when pipe was laid, but the same method might be employed in greater depths. The crossing was close to and parallel with a highway bridge from which all the work was done. As the water was used for boating, no obstructions were allowed, so that the pipe when laid had to be at least 5 ft. under water. The pipe was laid on spruce piles driven in bents of two from the bridge. They had to be cut accurately as to grade, and, as the cutting had to be done under more than 5 ft. of water, a light riveted steel cylinder 6 ft. in diameter and 10 ft. in length was lowered over each bent of two piles until it rested on the bottom vertically. To seal the bottom edge, sand and gravel were deposited round the outside. By means of a pulsometer pump the water was removed from the interior of the cylinder, the piles cut and capped with the desired timber. The cylinder was then drawn up and placed over the next bent of uncut piles and the same operation repeated.

When this was completed the pipe was connected and lowered from the bridge into place. The entire cost of this work, exclusive of the cast-iron pipe and lead for joints, was $561.

Another unique example of simple but effective means of trenching a river bottom for pipe laying was for the 12-in. pipe laid under the Otonabe River to supply Ashburnham with water. The current is very swift at the point of crossing, and the pipe had to be imbedded fairly deep in th eriver bottom, not only on account of the rapid flow but also because of the log drives coming down every spring. Booms were first slung across the stream and an ordinary rooter plow used with handles extended to reach the surface. Block and tackle was then fastened to plow and anchored at shore, and a team of horses were used to do the pulling. In this way the trench was ploughed and scraped out with a road scraper to the required depth. Of course, this would work all right with flexible joints, but more care would have to be exercised if rigid joints were used.

Other examples of the various methods employed in laying under-water pipes could be cited, but the foregoing seems to me to be sufficiently comprehensive to serve most of our needs; but the advent of welded joints with modern wrought-iron and steel pipe will no doubt modify the plans of many future installations of this character.

In the preparation of this paper I wish to pay tribute to the courtesy of the *Canadian Engineer*,

AMERICAN GAS LIGHT JOURNAL and, last but not least, to the valuable assistance rendered by George McCrackin, our street-main foreman, who for many years was identified with a large waterworks contractor.

Organization and Plans of the International Chamber of Commerce

The recent organization of the International Chamber of Commerce at Paris is the fulfillment of a dream long held by the most progressive business men of the world. For years enlightened business men everywhere looked forward to the day when there would be set up in the world an institution which would serve to bring the nations together and facilitate the friendly settlement of foreign trade problems. They had recognized that personal friendships between business men and bankers of the different nations go a long way towards minimizing misunderstandings and prejudices.

At the Paris conference, all the proceedings went to show that there is a much greater realization now than perhaps ever before of the necessity for co-operation in matters of world trade. It is coming to be seen that a distinct benefit to all the people of the world is to be derived from having a voluntary international body thoroughly representative of many nations ready to discuss and adjust such important questions as finance, raw materials, production, shipping, unfair competition and numerous other phases of international trade.

Although the principal work toward the erection of a world chamber of commerce was accomplished in June at Paris, it should not be forgotten that the project was really launched a year ago at Atlantic City. Delegates to the International Trade Conference discussed the possibilities of such a body.

Foreign trade in its many ramifications was discussed at the organization meeting by business men of international reputation. By resolution, the International Chamber said that it considered it to be the first duty of the producers of all countries in the world, in order to re-establish the economic balance and to insure peace on a permanent basis, to increase by every possible means, the production of raw materials that are necessary to the world's economy.

In order to bring about this end and facilitate the efforts of the producers, the International Chamber proposes to organize at once a statistical bureau, the duty of which will be to keep up to date statistics of output, productive capacity, and probable needs, together with the movement of exports and imports of each country.

The chamber also contemplates the creation within its own body of a clearing house for goods, the aim of which would be to make easier the exchange of goods through compensation in order to lessen the cost of transport, the exchange of money between allied countries, and the financial cost of the transaction.

In order to conserve and increase the world stocks of fuel, the Chamber recommended that all countries expedite the utilization of hydro-electric power in the largest possible way; to hasten the carrying out of measures designed to insure the most scientific and economical use of mineral oil; to develop research and the extraction of all oil and fuel resources of the world.

The chamber urged prompt agreement of the associated countries in order to avoid making individuals or companies of any one country liable to more than one tax on income. It was further urged that the board of directors make representations at once to the governments of the countries concerned, and to endeavor to secure legislation in their respective countries to carry out the intent of this resolution.

Reduction of both personnel and government expenditure was advocated by the delegates in order to reduce taxes and to stabilize business. It was pointed out that could this be accomplished, there would probably be a reduction of the cost of necessities. The chamber felt that national and local chambers of commerce are best fitted to advise reductions promptly and efficiently because of their non-partisan character, and it ventured the opinion that Government administrations would welcome such non-partisan counsel and co-operation. The International Chamber recommended the national and local chambers to offer their service to gain this result.

One of the most important actions of the new organization was the adoption of a resolution calling upon the president and board of directors to appoint a special committee to study the advisability of establishing a foreign credit interchange bureau upon a reciprocal interchange basis with such countries as may desire to avail themselves of such service for their exporters and the future development of their foreign trade.

The International Chamber expressed the opinion that it is the duty of sellers in all countries which fought together during the war to do everything consistent with business principles to extend to the very utmost credit facilities to buyers in allied countries during the reconstruction period. The attention of the conference was drawn to the existing inequality of treatment accorded to foreign banks under the laws of various nations, and the delegates suggested the desirability of seeking practicable amendments to secure the advantages to be gained by reciprocal privileges.

It is planned to appoint a special committee to study the international exchange from an economic and financial point of view in each of the interested countries, and particularly in Germany, in order to determine the real value to be given to the money of these different countries, and failing to effect stabilization, what measures can be taken tending in a degree to improve exchange.

In view of the unsatisfactory results in the past from subsidy systems, the chamber recommended that all subsidy systems should be done away with except for shipping services having a character of public necessity and on routes that would be commercially unworkable by private enterprise.

Resumption of the work of the international committee for the unification of maritime commerce regulations, which was interrupted by the Euorpean war, was urged.

Revocation of import and export prohibitions as the internal conditions of each country permits was favored by the chamber. On the question of customs laws and regulations, the conference recommended that the five foundation governments establish technical commissions to devise the ways and means to be advocated for obtaining uniformity of these matters.

An important resolution adopted had to do with unfair competition. This resolution stipulated that development of means adopted to lessen unfair competition in the different associated countries is the special field of legal experts, and it is necessary before taking any action to consider existing legislation that differs essentially in various countries. The resolution expressed the wish that among the first acts of the new body would be the creation of an appropriate body at each national bureau

under the direction of an organization of a similar nature attached to general headquarters, the duties of which judicial bodies would be to study questions of unfair competition, industrial property, trade-marks and names of origin solely from the legal point of view, and to prepare reports to be submitted to the general meeting in London next year.

Like the Chamber of Commerce of the United States, the constitution of the international body provides for the submitting of international trade questions of general and immediate interest to the membership for a vote. The referenda will be taken in the associate countries and the result published by the International Chamber.

The constitution also provides for two classes of membership—organization and associate. The annual dues of each class is fixed at 300 francs, except that in the case of organizations this fee is used as a basis, and is a minimum charge for organizations entitled to only one delegate. An additional fee of 500 francs is charged for each additional delegate. In general, the number of delegates to which an organization is entitled is fixed on the basis of one delegate for every 200 members of the organization, the minimum in all cases to be one, and the maximum number of delegates, ten.

Organization members will comprise national and local commercial, financial and industrial organizations representative of the interests they embrace. They must not be conducted for individual profit or for partisan purposes. Associate members will consist of individuals, firms and corporations.

The constitution of the new organization provides for a board of three directors and three alternates selected by each of the countries represented. The American directors are John H. Fahey, formerly president of the Chamber of Commerce of the United States, of Boston; Willis H. Booth, of New York; Edward A. Filene, of Boston. The alternates are Harry A. Wheeler, formerly president of the Chamber of Commerce of the United States, of Chicago; William Butterworth, of Moline, Ill.; Owen D. Young, of New York.

Dr. Edouard Dolleans, professor of political economy at the University of Dijon, who is the temporary secretary-general of the International Chamber, is directing the work of setting up the machinery of the chamber.

Producer Gas from Peat

Many attempts, with varying degrees of success, have from time to time been made to utilize peat in gas producers as an alternative to direct combustion under boilers. By the latter method at one station on the continent, steam-generated electrical power has been for some years distributed over a wide area of 25 miles radius, but success such as this necessitates drying down the peat to at least 25 per cent of moisture and furnaces properly designed for this type of fuel.

A series of trials has been recently made with producer gas from peat by the Norwegian Moor Company at the Peat Institute, Vaaler, Solor, Norway, on a peat carrying 1.57 per cent of ash and 21.7 to 43 per cent of moisture. These tests indicate that it is possible to obtain, in the gas produced about 75 per cent of the calorific value of the peat, which is much in excess of what can be obtained by direct combustion on a grate. Further, in the gas engine 20 to 25 per cent of the heat value of the gas is utilized as against 10 to 15 per cent in a steam engine. In the gas producer tests about 31 lb. of peat was consumed per hp. hour on a light load, and about 2.5 lb. per hp. hour on a full load, these figures being exclusive of the fuel used in starting up and finishing the gas producer operation and that required for running the tar separator. Allowances for these subsidiary consumptions brings the figure to that usually obtained in Denmark, where some electricity power stations run on this fuel.

As steam installations with peat-fired boilers consume about 4 lb. peat with 25 per cent moisture per hp. hour, the utilization of peat in gas producers thus offers a 33 per cent greater economy, with the added advantage of the gas producer dealing with peat carrying up to 40 per cent of moisture against the limit of 25 per cent in steam practice. The gas from a peat containing 40 per cent moisture, is quite suitable for gas engines, as its thermal value is of the order of 100 B.t.u. per cu. ft., but this can be increased to 150 B.t.u. per cu. ft. when the producer works at full capacity. Moist peat gives a larger yield of tar owing to the lower temperature of gasification.

Comparing peat with fuel oil, comparative quantities per kilowatt hour are 5 lb. and .68 lb. respectively. With oil in Norway at £13.6.0 per ton, peat answers as a substitute when obtainable in the air-dry form at £1.13.2 per ton, a practical figure if the plant is erected near the peat moors, thus reducing transport to a minimum.

Bureau of Mines Prepares Films Showing Various Phases of the Mining and Metallurgical Industry

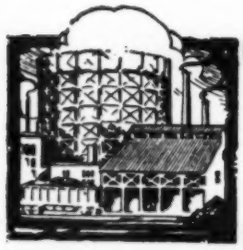
A new four-reel motion picture film telling the complete story of petroleum has just been completed by the United States Bureau of Mines in co-operation with the Sinclair Consolidated Oil Corporation, and will be loaned for educational purposes to those desiring the same after September 1, by applying to the Bureau of Mines, Washington, D. C.

This interesting story was taken at a considerable expense and it was endeavored to show in this film the entire story of the petroleum industry, including prospecting, production, refining, distribution and its ultimate uses. The film was gotten up with the sole idea that it was to be used for educational purposes, and therefore was made in such a way as to be readily understood by the layman, as well as the engineer student.

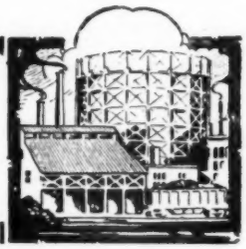
This is one of a number of films that has been recently completed by the Bureau of Mines showing various phases of the mining and metallurgical industry, and it is hoped that the borrowers of these films will treat them with the same care that has been taken in preparing them. Those requesting the loan of "The Story of Petroleum," or any other films belonging to the Bureau of Mines, are expected to pay the cost of postage both from the Washington office and return.

Pacific G. & E. Report Shows Larger Profits

For the six months ended June 30 last Pacific Gas & Electric Company reports surplus after charges, depreciation and Federal taxes of $2,080,575, equivalent after preferred dividends to $3.57 a share earned on the $34,004,058 common stock. A surplus of $2,127,763 resulted from the company's operations in the first half of last year. Gross earnings from January to June of this year amounted to $16,374,736, an increase of $3,482,363, but the total for expenses, taxes and depreciation was $3,248,279 larger.



NEWS OF THE GAS INDUSTRY



Dallas Authorities Grant Gas Rate Increase—Long Controversy Settled

At last the long-drawn-out controversy between the City of Dallas (Texas) and the Lone Star Gas Company has been settled. The increased rate asked by the gas companies was granted in an ordinance passed unanimously at two readings by the city commission of Dallas, the last city served by the Lone Star Gas Company to make the new rate. The ordinance, which placed the rate at 67½ cents per 1,000 cu. ft. net, to become effective Sept. 15 or upon the completion of the Joshua Junction line and the actual delivery of the new supply from the West Texas fields, had the emergency clause affixed which makes it become effective immediately upon its final passage. Henry Morris, vice-president and general manager of the Dallas Gas Company, said that the provisions of the ordinance will be accepted by his company, although the minimum charge on the monthly bills will remain 50 cents as under present franchise.

An initial rate of 75 cents a thousand cu. ft. with the usual 10 per cent reduction for payment within ten days is granted in the ordinance to remain in force for a period of twelve months. During the second two years for which the ordinance runs the rate may be increased to the consumer 3 cents each time the Lone Star Gas Company is forced to pay 1 cent more a thousand feet for gas at the wells, provided, however, that the rate never exceeds 87½ cents or 75 cents net to the consumer during that period. At the end of the three periods covered by the ordinance the rate will revert to the present price of 45 cents net, and the present franchise will become again operative unless changed by the city in the meantime.

According to the provisions of the ordinance, the effective date set at Sept. 15 is wholly contingent upon the completion of the 16-in. line from Joshua Junction to a point on the Dallas-Fort Worth line and the delivery of the new supply through that line. Should the completion of the line be delayed the effective date of the new rate will be postponed until it is completed. The Dallas Gas Company must file its acceptance of the provisions of the ordinance within ten days of its final passage, and the ordinance will not become operative under the emergency clause until this acceptance is filed.

The final passage of the ordinance will bring to an end the negotiations between the city of Dallas and the gas companies that have covered a period of eight months and have been definitely broken on two occasions. The controversy began following the serious shortage of gas last winter, which was followed by public hearings and investigations by the city of Dallas, which ended when the city of Dallas filed suit against the Lone Star Gas Company.

The proposal was finally declined and full negotiations broken off between the city of Dallas and the gas companies, and the Cox Gas Pipeline Bill, putting pipeline companies under the jurisdiction of the Railroad Commission, passed in the special session of the State Legislature, which, however, will not become operative before the latter part of September. With the dissolution of the North Texas Gas Users' Association, following the withdrawal and signing up of practically every city for the new rate except Dallas, and the resignation of Commissioner Reppert and appointment of Commissioner Blaylock, the attitude of the commission toward the increased rate changed to some extent, and it was generally understood that the increase would be granted as soon as a new proposal was made the city of Dallas. Now everybody is happy and feel that they will have an adequate supply of gas the coming winter.

ARKANSAS NATURAL GAS COMPANY, Little Rock, Ark., has declared an initial regular dividend of 2 per cent and 3 per cent extra, payable Sept. 30 to stock of record Sept. 15.

American Coal Mining Co. Denied Injunction by Federal Court

At Indianapolis, Ind., Sept. 7, three judges of the Federal Court, including Francis E. Baker, Ferdinand A. Geiger and E. A. Evans, denied the American Coal Mining Company an injunction to prevent the operation of the special fuel commission created recently by the Indiana General Assembly to regulate prices charged for coal in Indiana. The opinion in detail will appear in an early issue of the **Journal**. In brief it upholds the right of the State to enact such a law. Jesse E. Eschbach, head of the new commission, said he will within ten days promulgate prices for coal in Indiana. The opinion has the most far-reaching effect on utility companies generally throughout the State, and should mean immediate reduction of fuel costs for gas utilities.

Additional Exhibitors at the A. G. A. Convention

Additional exhibitors who have been assigned booths at the 1920 exhibition of the American Gas Association are as follows:

Booth No. 42—American Gas Appliance Company, 108 Lawrence Street, Brooklyn, N. Y.

Booth No. 93—M. T. Davidson Company, 154 Nassau Street, New York City.

Booth No. 108—The West Gas Improvement Company of America, 150 Nassau Street, New York City.

Booth No. 12—Novo Manufacturing Company, Inc., 424 West Thirty-third Street, New York City.

Booth No. 30—Cabco Sales Company, 6 Jamestown Street, Gowanda, N. Y.

Booth No. 40—Bishop Gutta-Percha Company, 420 East Twenty-fifth Street, New York City.

Annual Convention of W. Va. Natural Gas Men Most Successful

Nine hundred men engaged in the production of natural gas in West Virginia gathered in Charleston, W. Va., Sept. 1 and 2, for their fifth annual convention. The outstanding feature of the convention was the decision to admit oil men to the organization, and the name was changed from the West Virginia Natural Gas Association to the West Virginia Oil & Natural Gas Association. The resolution recommending the change was passed by a unanimous vote.

Harry Wallace, of Charleston, of the United Fuel Company, was elected as the new organization president. He succeeded George B. Riddle, of Wheeling, who presided at the sessions of the convention. Other officers elected were: Vice-president, Pat McDonough, of Parkersburg, Continental Oil & Gas Company; secretary-treasurer, Edwin Robinson, of Fairmont; directors, I. H. Dye, Charleston, Pure Oil Company; Noah Moore, Mooresville, Mooresville Oil Company; Lynn S. Horner, Clarksburg, Washington Oil & Gas Company; W. H. South, Morgantown, Randall Gas Company; George B. Riddle, Wheeling, West Virginia Natural Gas Company.

The new officers were suggested by a nominating committee which consisted of Col. Fred Paul Grosscup, of Charleston; Talton W. Engle, of Grafton, and John Davison, of Charleston. The new board of directors consists of two oil men, one oil and gas man and two gas men.

The resolution providing for the changes in constitution and by-laws making the association jointly oil and gas was introduced by Osman E. Swartz, of Fairmont, a member of the retiring board of directors, and was seconded by three men as provided in the laws, among whom was Lynn S. Horner, of Clarksburg, who was the first president of the West Virginia Natural Gas Association. This resolution was carried unanimously. The discussion on the floor developed the fact that a movement has been under consideration for the past year looking toward consolidation.

The final session of the convention was made interesting by the reading of a paper, "The History of the Natural Gas Industry in West Virginia," by State Senator Wallace Gribble, of West Union; a paper, "Conservation of Gas by a Mud-Laden Process," by A. W. Ambrose, of the petroleum section of the U. S. Department of Mines, who is temporarily located at Bartlesville, Okla.; a paper, "Observations of a Public Service Commissioner," by Judge E. G. Rider, of the West Virginia Public Service Commission; a paper, "The Upward Scale," by Frank B. Pryor, of Fairmont, manager of the gas department of the Monongahela Valley Traction Company, and a paper, "Difficulties in Field Operation," by J. P. Campbell, of Clarksburg, a foreman of the Hope Natural Gas Company.

The 1920 convention was characterized as a success in every way by the delegates. The fact that it was held on the first and second days of the month was expected to interfere somewhat with attendance, as many of the foremen in the fields are especially busy on these days; but in spite of this fact the attendance at this convention was quite as large as the convention held last year at Wheeling. There were about 900 oil and gas men here out of a total membership of 2,500.

The project of combining the oil and gas men into one association, which has been brewing since the convention in Wheeling last year, came to a sudden head at the final session of the gas men, and a resolution was introduced by Osman E. Swartz, a retiring director of the association and a lawyer from Fairmont, which provided for new portions of the by-laws and constitution and for a new name—the West Virginia Oil and Natural Gas Men's Association.

The West Virginia Natural Gas Association was organized in Charleston five years ago. One of its fundamental principles is cooperation between employer and employee, and both are admitted to membership in the organization.

L. B. Denning, of Pittsburgh, vice-president of the Ohio Fuel Supply Company, who is a member of the National Committee on Natural Gas Conservation named by Franklin K. Lane when the latter was Secretary of the Interior, made an address on "Conservation," in which he said:

"As applied to a natural resource, such as natural gas, the term 'conservation' may be defined as meaning the most intelligent and efficient use and the obtaining of the best results from such use. In the period of early development of natural gas production, usually natural gas was discovered by the seeker for oil. Very rarely if ever did the pioneer drillers in new fields have the production of natural gas as the primary purpose of his adventure, because gas is not so easily transported and handled as oil, but must be transmitted entirely through pipe lines, and the cost of transportation materially increases as the distance becomes greater from field to market. Because the pioneer driller usually had most of his capital tied up in the venture and was anxious to get some return on it immediately, he sought the nearest and most convenient market.

"The market price for gas was usually established by political representatives of the people on the one hand and the producer on the other hand, without any regard whatsoever to the value of the commodity sold. Appliances for using gas were crude, inefficient and wasteful. The gas producer wanted to sell all the gas he could, and the public had absolutely no incentive for saving. The result of such policy was inevitable—namely, wastefulness and an unnecessary decline in the volume of gas produced, the decline being very rapid in some instances and somewhat slower in other instances, due to the size of the market and volume of gas produced.

"The production figures of one of the companies with which I am connected for 1920 to date, compared with 1914, show an average decrease in volume per well in Ohio of 34 per cent. Since the cost of drilling wells has more than doubled and the production has declined one-third since 1914, it is plainly apparent that the cost of producing natural gas has not merely doubled in that period of time but has increased at least three times. It is hardly necessary to dwell at length upon these features—namely, declining production and increasing cost—because every man connected with the natural gas industry has had these facts clearly brought home to him during the last five years. Facts being what they are, it behooves us to find a remedy to meet the situation if possible.

"To my mind the remedies are two:

"First — The placing of such price for natural gas as will more nearly represent its comparative value with other fuels, which, in my judgment, will of itself force the elimination of crude, wasteful and inefficient appliances by the gas-using public and the installation of modern appliances, and more care and attention upon the part of the user, thereby reducing consumption and prolonging the life of the field.

"Second—The education of the gas-using public through public representatives, such as public utility commissions, schools, etc., and demonstration of proper appliances and distribution of educational literature by the companies, so that the householder may be informed as to the best methods of using gas.

"I have placed adequate price first in the foregoing because I believe it is the most important and will have the greatest immediate effect. The educational program should go hand in hand, however, with the campaign for higher prices, so that the public may know that it is entirely possible, according to reports from the Bureau of Mines of the United States Government, to obtain efficient results with not more than one-third of the volume of gas now used in the household. This means that the average domestic consumer can obtain practically the same results as now had with one-third the volume of gas; so that, were the price to be increased to three times what it is now, the average annual outlay of gas service would not be increased."

Lack of Coal Causes Gas Plant Shutdown

The coal supply of the city of Jefferson, Ind., has been exhausted and the plant of the United Gas & Electric Company has suspended operations, with no promise of resumption until a carload of coal arrives from eastern Kentucky fields.

The gas supply began to fail shortly after noon, and by 2 o'clock every home in the city was without gas. Domestic users bear the brunt of the hardship imposed by the shutting down of the gas plant, as few of the industrial plants use gas.

Additions to Program of the Sixth National Exposition of Chemical Industries

Further additions to the program of the Sixth National Exposition of Chemical Industries, Sept. 20 to Sept. 25, in Grand Central Palace, New York City, have been made, and the program is now about completed. An addition to the list of speakers for the opening night, Monday, Sept. 20, is Erastus Hopkins of Gaston, Williams & Wigmore, Inc., who will read a paper on "Problems Confronting the American Exporter."

At the Fuel Economy Symposium on Tuesday afternoon, W. R. Van Nortwick, the Roto Co. has been added to the list of speakers. He will talk on "Increasing Conduction and Reducing Fuel Consumption." Also at this session W. A. Macan, of the Magnesia Association, who will read a paper on fuel economy, has been added.

Also there are two additions to the Materials Handling Symposium on Wednesday afternoon. Rumsey W. Scott, of the Technical Advisory Corporation, will address the gathering on "Bringing Food to the Table," and W. T. Spivney, M. E., will talk on "Cost Cutting with Conveyors."

Added to the program of the Ceramic Symposium on Friday afternoon will be a condensed committee report on "The Significance Attached to the Term 'Ceramic' in Ancient and Modern Usage." There have also been several additions to the moving picture program to be given during the week.

Dr. Charles H. Herty, chairman of the advisory committee of the exposition, was in Chicago, Sept. 6 to 11, attending the meeting of the American Chemical Society. This was attended by hundreds of chemists from all over the country, the vast majority of whom will come to New York for the chemical exposition. Many of these will speak at the "four minute" address periods that the management has been forced to place on the program, because of the large number of speakers.

Work of installing the exhibits on floors, two, three and four of the Palace has made great progress, and on Sept. 13 the main floor will be ready for the workmen. The details attached to putting in place 460 exhibits, of the breadth and scope of those composing the chemical exposition are voluminous but it is certain all will be in place on the opening night.

Invitations have been sent to Governor Alfred E. Smith, and his staff, as well as to members of the national and state legislatures to visit the exposition and see what the American chemist has done to benefit the United States.

Work of Laying Big Gas Mains Started

Actual work of laying the big gas mains that will convey coke oven gas from the furnaces of the Sloss-Sheffield Company to the plant of the Birmingham (Ala.) Railway, Light & Power Company has commenced.

Officials of the utility company stated that the work of laying the mains would be completed in about sixty days. The contract with the city specifies that the Birmingham Railway, Light & Power Company shall be ready to furnish the gas by Dec. 10.

No little trouble is being encountered in digging the trenches on account of the numerous water mains, sewer, steam and gas pipes that form a network of pipes along the route of the big gas main.

The cost of laying the 16-in. pipe that will conduct coke oven gas will be about $300,000.

United Gas & Electric Shows Gain in Subsidiaries' Profits

Gross earnings of the subsidiary companies of the United Gas & Electric Corporation for July amounted to $957,590, compared with $773,591 for the corresponding month of last year. Net, after taxes, totaled $280,629, against $273,621 for the same period of the previous year.

Surplus, after fixed charges, was $124,373, an increase of $437. Gross earnings for the twelve months ended June 30 last were $11,618,764, compared with $9,754,931 for the corresponding period of the year before. Net earnings amounted to $4,004,617, an increase of $846,389. Surplus, after fixed charges for the period, was $2,172,785, an increase of $772,757.

U. G. I. Dividend

Directors of the United Gas Improvement Company, Philadelphia, Pa., have declared the usual quarterly dividend of 2 per cent on the common stock, payable Oct. 15 to stock of record Sept. 30.

N. J. Gas Association Aids Utilities in Securing Modification of B.t.u. Standard

The summer meeting, which was held at Asbury Park on July 23, was declared a grand success by the sixty members and guests present. A large share of the business meeting consisted of a timely discussion of the proposed new B.t.u. standard.

The association was represented at the hearing the following week before the utility commissioners. A communication was delivered to the commissioners setting forth the oil situation and asking for a reduction in the standard of heating value.

As a result of this hearing the utility commission issued the following orders:

1. That Rule IX shall be modified to read as follows:

"The company furnishing gas which, within a one-mile radius from the distribution center, gives a minimum total heating value of not less than 525 B.t.u., may be considered as giving adequate service so far as the heating value of the gas is concerned."

2. That Rule X shall be amended to read as follows:

"Each gas company whose output exceeds 20,000,000 cu. ft. a year shall equip itself with a standard calorimeter outfit, constructed and calibrated as approved by the National Bureau of Standards, with which periodic tests upon the gas shall be made. A record of these tests shall be made and kept on file in the office of the company and a summary of the results sent to the board's office monthly."

3. That each gas company, within the period from Aug. 15 to Nov. 1, 1920, shall examine and readjust, where necessary, the appliances located on the premises of the consumers so that the respective customers may obtain satisfactory service from the appliances in use. The change in standard due to the adoption of this amended rule shall be made effective in three approximately equal steps, but shall be made fully effective not later than Nov. 1, 1920.

Another decision which should be of great importance to all gas companies in this State is that which was given Aug. 7, 1920, in the New Jersey Supreme Court in the case Elizabethtown Gas Light Company vs. Board of Public Utility Commissioners. Quotations are given below from the decision in this case:

"The companies claim that there was an undervaluation of their property, first, because the commissioners adopted as the standard of value the average prices prevailing for five years preceding Jan. 1, 1916; second, because they disregarded the only evidence as to going concern value and adopted an arbitrary sum not sustained by any evidence at all, and, third, because they arbitrarily omitted what is called the overhead valuation on land owned by the companies, being, as I understand it, the cost of acquiring and assembling the land employed by the companies for the manufacture of gas."

"I think it entirely clear that the failure to allow for prices at the time to which the rates apply, July 1, 1919, was an error. To what extent the increase in prices may be due to an inflation of the currency or to any particular cause we do not know. What we do know is that the dollar of 1919 and the dollar of 1920 is worth less than the dollar of 1916, and still less compared with the dollar of the average year from 1911 to 1916. If it were proposed to value the property of the gas company in 100-cent dollars and allow them a return only on that, while other values were on the basis of 50-cent dollars and just double in number, everyone would see the injustice: so far as the increase in prices is due to inflation of the currency, the illustration is a perfect one. There is another consideration which has also worked against the gas light company. In the year 1919 the rate of interest had increased so that on securities of undoubted value, such as United States Government bonds, the rate of interest instead of being 3 per cent, or perhaps less, had gone up to the neighborhood of 6 per cent. Obviously, in such a situation an 8 per cent return in an active business in which the risks and hazards had been increased was much less than a rate of 8 per cent in 1913, when the Passaic case was decided. No allowance seems to have been made for this increase in the rate of interest."

"The companies were allowed an increase in rates which I think inadequate. If, however, I set aside the order the old rates would be restored and this would work the very injustice that these proceedings are intended to correct. I see no reason, however, why I may not render a judgment sustaining the present order so far as it goes and remanding the case to the commission for rehearing to determine how much additional should be allowed. That will be the judgment. The prosecutors are entitled to costs."

As a result of the two discussions quoted above the outlook for the gas companies in New Jersey begins to look more encouraging. At the same time we believe that those who are in touch with the gas industry in New Jersey are realizing more and more the importance of unified action by the gas companies before the utility board and courts.

In order to accomplish this the New Jersey State Gas Association should have a 100 per cent representation of those who direct the management of the gas companies in New Jersey. It is believed that a number of men who attend and take part in our meeting are not members. Many companies in the State are not represented at all. In other companies where there are only one or two members of the State association there should be half a dozen or more.

You will greatly aid the organization of the gas industry in this State if you will take a minute or two at this time to send in suggestions for membership.

FRED R. CUTCHEON,
President.

HAROLD E. MASON,
Secretary.

Dividends Declared

The board of directors of the Oklahoma Gas & Electric Company has declared the regular quarterly dividend of 1¾ per cent on the preferred stock of the company, payable Sept. 15 to stockholders of record Aug. 31.

The board of directors of the Muskogee Gas & Electric Company has declared the regular quarterly dividend of 1¾ per cent on the preferred stock of the company, payable Sept. 15 to stockholders of record Aug. 31.

The Niagara Falls Power Company declared the usual quarterly dividend of $1.50 a share on the common stock, payable Sept. 15 to stock of record Sept. 1, and regular quarterly dividend of $1.75 a share on the preferred, payable Oct. 15 to stock of record Sept. 30.

Western Gas Companies Outlook for Dividends Dubious

People's Gas May Break Even—Laclede Gas Earns Small Surplus

Peoples Gas of Chicago, incorporated in 1855, had an excellent earnings record up to the time when increased costs blasted the prosperity of so many utilities companies. It is true that the 8 per cent dividend rate of 1914-15 allowed only a small margin of safety, but the company had a comfortable surplus and was under the able guidance of Samuel Insull. In 1915 the book value of the stock stood at $136, working capital averaged one-third of gross revenues, and the stock sold at an average price of 115, to yield about 7 per cent.

In 1916 the approaching storm was indicated by the barometer of operating costs, which had steadily averaged about 6 per cent of revenue during the previous six years, but then rose to over 66 per cent. In the two following years the ratios were 82 per cent and 87.7 per cent, resulting in deficits after payment of fixed charges. By 1919, however, the management had the situation somewhat in hand, the operating ratio was reduced to 82.5 per cent and a small surplus was earned. Dividends had been abandoned in November, 1917, and it is probable that some time must elapse before they can be resumed.

The company has made the usual strenuous fight to increase its charges with the usual indifferent success. In 1917, by a dicker with the city authorities, it was allowed to eliminate the candle-power standard for its product, and reduce costs by building a coal-gas plant, the price per thousand feet being reduced, however, from 80 cents to 70 cents (with lower rates fixed on a quantity scale).

In 1918 the company petitioned the Public Utilities Commission for a 27½ per cent increase in rates, which was allowed, and in 1919 a further increase of 6 per cent was requested. As a result of opposition by the municipal authorities, the commission not only refused any new increase, but cut down the previous allowance slightly, fixing the basic rate at 85 cents.

Early in 1920 the company asked that the rate be fixed at $1.25, stating that even this figure was 7 cents below actual requirements, in view of increased payroll costs amounting to nearly $2,000,000 for 1920. The commission compromised by fixing a temporary rate of $1.15 for small consumers, and the city is still fighting this concession.

It is understood that a final scale of rates will not be determined until the commission's valuation of the property is completed. It has recently been announced that a figure of $56,250,000 was arrived at by a committee appointed by the commission, and that a depreciation charge of about 19 per cent would be allowed, presumably making the amount on which rates would be figured about $70,000,000. Six per cent on this amount would leave perhaps 5 per cent for the stock after payment of fixed charges. It is understood that no final action has yet been taken by the commission, however.

Engineers employed by the company have valued the property at from $90,000,000 (about the book value) to $105,000,000.

In the meantime the company has also been involved in some tangled litigation known as the "$10,000,000 rebate suit." This famous case has already hung fire in the courts for some eight or nine years, and it is stated on the authority of a municipal attorney that several years more must elapse before the wheels of justice grind out a final decision. Briefly, the case involves the constitutionality of the act of 1905 whereby the Legislature granted the City of Chicago the right to fix gas rates. Inasmuch as this right is now vested in the Public Utilities Commission, the case presumably has no bearing on the present situation, but concerns the rates fixed in former years and the liability of the company to make a refund thereon. If the company should be required to deposit or refund the full amount of $10,000,000 it would be a sad blow to its financial condition for the present surplus would be very nearly wiped out. It is to be hoped that the lawyers will eventually find a way out of the difficulty.

The company has also met with local opposition in connection with its plans for expansion. In February this year the formation of a new subsidiary, the Chicago By-Products Company, was announced, whose securities would be jointly guaranteed by the Peoples Company and the Koppers Company, a Pittsburgh concern interested in various utility construction enterprises. The new company was to construct in about two years huge coal gas and water gas plants, whose output would about equal half that of the present plants, part of which they are doubtless intended to replace.

As its name signifies, the new concern would, in addition to furnishing gas to the Peoples Company, produce various by-products, the possibilities of which were formerly not appreciated. The Gas Company was to have the right to take over the property four years after operations begin.

Soon after the plan was announced the city council declared it to be illegal and requested the Public Utilities Commission to disavow the project, but apparently the commission has placed no obstacles in the development of the undertaking.

As regards the outlook for the immediate future, the company should be able to scrape through 1920 without facing receivership, as the increase in rates from 85 cents to $1.15, operative for the last half of the year, should yield in the neighborhood of $1,000,000 additional revenue. For the first quarter of the year the company reported a deficit of $710,000, and it is not clear whether this included full settlement for the 10 per cent wage increase allowed in March, retroactive to December 1. Interest charges may also increase this year, because of the joint guarantee of interest on the By-Products Company bonds issued this year. From an accounting point of view, however, this interest should be charged to construction costs.

The company fixed its financial "requirements" for 1920 at $1.32 per thousand (as against $1.15 allowed for half of 1920), but this estimate was probably rather liberal.

The outlook for the future depends on the valuation figures adopted, the outcome of the rebate suit, and possible profits from the By-Products Company.

Laclede Gas Light Company

Laclede Gas, which controls the gas business of St. Louis, has come through the ordeal somewhat better than Peoples Gas. While net income has shown a decided slump the company has been able to maintain dividends on its preferred stock. The dividend on common had to be abandoned in June last year, however, after uninterrupted payments for twenty years.

In 1918 the Federal Government asked the Laclede Gas Light Company to recover toluol for use in munitions as well as to build two plants for the production of shells, new facilities to be constructed under guarantees from the Government. The company did not realize any profit from this venture, inasmuch as the

end of the war interrupted the construction work, and it is understood that the entire matter has now been cleared up and is not reflected in current accounts.

The company filed new gas rate schedules with the Public Service Commission of Missouri in July, 1918, requesting a 15 cent increase. A year later about two-thirds of this increase was allowed, the new rates being effective for thirteen months.

Increased revenue of $652,000 was anticipated, the new rates being estimated to give a net earning capacity of about 6.43 per cent on investment (after allowing for depreciation of $400,000 per annum) but actual results were apparently slightly better than this.

Taking the valuation of the plants at the commission's figures of $30,000,000, income before charges for 1919 was only about $125,000 below the allowance of 6.43 per cent. If, therefore, the commssion should adhere to this valuation figure after its investigation is completed, and fixes rates accordingly, earnings on the common stock will be limited to 1 per cent or 2 per cent on the present operating basis, as against former average earnings of 8 per cent to 9 per cent.

The funded debt and preferred stock together amount to about $28,500,000, and as interest charges and dividends require a return of about 6.2 per cent against 6.43 per cent allowed on $30,000,000 by the commission, the small amount remaining for the common stock is explained.

It is to be hoped, however, that the courageous step recently taken by the Interstate Commerce Commission in granting a generous advance in railroad rates will be reflected in a more liberal attitude on the part of local utility commissions, and that Laclede Gas will be able to obtain a larger figure for its property investment, or a higher percentage return thereon.

Merced Granted Increased Rate

San Joaquin Light & Power Company, which serves gas to the city of Merced, Cal., and vicinity, has been granted authority to increase its Merced gas rates. The new rates, it is estimated, will yield the company a return of 7 per cent on its Merced gas investment, which for the purpose of rate fixing has been found to be $96,986.65. Rates in Selma also are increased by the order.

Newark to Let People Vote on Municipal Gas Plant

The indignation in North Jersey over the new increase in the gas rates of the Public Service Gas Company of Newark will have a chance to make itself felt in a practical way in Newark on Nov. 2, when the people will vote on the question whether Newark shall set up its own gas plant and make and supply gas. This vote is to be taken under the home rule act of 1917. Mayor Gillen of Newark is supporting the proposition while James R. Nugent is against it.

There is talk of asking the Jersey City Commission to take similar action in Jersey City.

In accordance with the ruling of the Public Utilities Commission that the $1.40 rate for gas may be imposed only from Aug. 1, President Thomas N. McCarter of the Public Service Gas Company has announced that where bills have been sent out carrying the new charge for August meter readings, which include a portion of July, rebates will be deducted from total charges for the current period.

John L. O'Toole of Public Service said that only a few August bills are now in the hands of consumers and that a very small proportion of these had been paid.

In granting the rate increase the Public Utilities Commission permitted the company to reduce the British thermal units of its output to 525, a reduction of seventy-five from the old standard. Mr. O'Toole stated that a reduction of fifty points has already been effected, and that the additional cut of twenty-five will be made within the period of two months the board allowed.

Department of Agriculture Experimenting with Gas Made from Straw

A gas which is obtained by the destructive distillation of wheat, oats and rye straws is now being produced upon a small scale at the experimental farm of the United States Department of Agriculture at Arlington, Va. Although an automobile has been operated with the new combustible, and it has been used for illuminating purposes as well as for cooking, the possibilities of straw gas are not yet fully determined, the department says. In order to determine the exact commercial value of the gas, David J. Price, engineer in charge of the new Office of Development Work, a subdivision of the Bureau of Chemistry designed to help commercial and industrial concerns to use new processes and discoveries developed in the bureau, has placed H. E. Roethe, Jr., in charge of a series of production tests with the experimental apparatus at Arlington.

The work can be carried on but slowing owing to the limited funds available at present, but it is planned to do much that will determine the quantity and nature of the gas that may be obtained from wheat, oats, barley, rye and rice straws, and from cornstalks, corncobs and other vegetable matter usually burned as waste. If the results of these tests warrant further investigation the experiments will be extended to the problem of plant equipment for producing the gas on a scale sufficient to allow the farmer to supply light and heat for his house, power for stationary engines, and, possibly, for his tractor from a small individual outfit.

While it has been possible to operate an automobile with straw gas and it is known that 5 lb. of straw will produce about 300 cu. ft. of gas—an amount sufficient to drive a light roadster fifteen miles—the problem of reducing the gas to liquid form or condensing it sufficiently to allow it to be carried conveniently is an essential one that must be solved before straw gas can be considered as a possible motor fuel.

Several valuable by-products are obtained in the manufacture of the gas. Carbon residue suitable for manufacturing lampblack of exceptional fine quality is one. This residue also contains certain amounts of potash, phosphates and nitrogenous compounds which give it fertilizing value.

The tar and ammoniacal liquids resulting from the process, aside from their value as disinfectants and preservatives, may prove useful in the dye industry. If the engineers succeed in perfecting the present apparatus and in reducing the cost of production, there is no doubt that straw gas will have an important commercial future.

BOSTON CONSOLIDATED GAS COMPANY reports output for August as 457,553,000 cu. ft., compared with 453,459,000 for August, 1919, an increase of 0.9 per cent.

Construction Notes

Stevens Point Company Installing New Gas Bench

The Russell Engineering Company at St. Louis, Mo., is installing another gas bench for the Wisconsin Valley Electric Company and Fred Wagner, construction engineer of the Russell Company, is in Stevens Point supervising the work. The bench which is being installed is of the most modern construction available for use in a small plant.

The lining and retorts are built entirely of silica instead of fire brick as is ordinarily used in gas benches, and will stand a constant temperature of around 2,500 degrees. A bench of this kind will turn out 70,000 cu. ft. of gas per day and while this extra capacity is not needed in Stevens Point, the company thought it advisable to install the extra unit for use in case one of the older benches should break down.

The construction work on the new bench will be finished in three weeks, after which it will be necessary to dry it out and bring it up to heat. This takes about four weeks longer.

The gas company has at present a three-month supply of coal on hand which is more than any other company in the State has succeeded in getting. Several plants in Wisconsin are still obliged to shut off the gas every night and sometimes during the day on account of coal shortage.

Norfolk Gas Plant Being Improved

In a statement concerning the condition of the plant, given out by the City Gas Company, of Norfolk, Va., it was said:

"The fact that new mains have been tied into particular sections has resulted, in a few instances, in the shifting of small deposits, the result of condensation in the piping, which has necessitated the blowing out of these pipes, and in some cases it has been necessary to dig up the piping and lay it new, to overcome the difficulties incident to providing new arteries through which the gas reaches these sections. This situation is improving rapidly.

"The new construction work authorized in January, this year, both as to works and as to distribution system, is well under way, notwithstanding delays in securing material, due to strikes in manufacturing plants and railroad congestion.

"In this connection, it was stated that in various sections of the city new mains have been laid and new connections established, in order that these sections may be adequately served, and a great deal of improvement in the service has resulted from these changes, especially in the outlying districts.

"The new 100,000-ft. holder in Berkley has been completed, and the work of running mains to and from it, to connect it with the existing lines, is under way. Some of the auxiliary apparatus for use in connection with this holder is now en route to Norfolk, and we expect to announce shortly the putting into service of this holder.

"In a few weeks other work, which has been long under way, will be completed, at which time announcement will be made, as we know it will be of great interest to the public."

New Equipment Will Improve Gas Service in Hanford

The Hanford Gas Company, Hanford, Cal., has received a carload of steel to be used in the construction of the new gasometer, which is to be erected on a concrete foundation, to be used for the storage and maturing of gas. The order for this scarce building material was placed many months ago and was long promised. The steel was cut to measure from metal on hand and it is expected that the installation will be completed within thirty days. The additional gasometer will enable the public utility concern to deliver gas of better quality and the consumers will be better pleased.

The company has also bought and there has been delivered on the ground a complete new setting including a generator, two scrubbers, seal box and all connections. Since the collapse of a tank some time ago, the gas works has been compelled to make gas in one tank, the completed compound being delivered to the users almost as soon as manufactured. The gas was frequently turned into the service pipes without a chance for cooling and certain impurities that would depart with the heat used in manufacture have made the mixture less efficient.

The addition to the local gas plant has been greatly needed for months and will increase its facilities, nearly doubling the output and resulting in better gas. The company has long sought to make these improvements but has been delayed by difficulties in getting the orders filled. The generator will be placed on a concrete foundation.

New Bench Completed at the Dixon Gas Works

With the completion of the new gas bench which is now in operation at the Dixon, Ill., gas house, officials of the company are optimistic that the greater part of their troubles, which have been of great annoyance to them and to their patrons, are over and that constant gas service can be maintained hereafter.

The installation and completion of the new gas bench increases the gas production of the plant one-third and probably never again have to stand for the uncertain and curtailed service of the past summer.

When sufficient fuel is received to operate two of the benches at full capacity, one of the old benches, which has been in need of repairs, will be torn down and rebuilt. The new bench will enable the company to use Illinois coal instead of depending on Kentucky coal for gas-making purposes.

New Oil and Gas Company Organized

Organization of the Ford Oil & Gas Company of Springfield, Mo., with a capital of $200,000 has been effected. A lease on 130 acres in the Bull Bayou oil fields, De Soto Parish, Louisiana, has been taken.

The first officers are Jesse Nance, Springfield, president; A. H. Walker, vice-president; Arthur Jones of Taney County, secretary and treasurer. The first board of directors comprises the officers and the following: J. B. Elam, Mansfield, La.; J. T. Hubbs, Willow Springs; R. B. Springfield. Drilling will be begun within sixty days.

Ukiah Gas Company Denied Right to Close Plant

The Ukiah Gas Company, which sells gas in the city of Ukiah, Cal., and vicinity, will not be allowed to retire from business because of its financial difficulties. As a remedy for the situation its 400 consumers will be asked to pay more for gas. This is in accordance with an order issued by the Railroad Commission in response to the company's request for authority to discontinue operation.